While, however, the Society, which, with its habitual energy, has set on foot the proposed expedition, is ready and willing to do all that is necessary to ensure success in the way of geographical exploration, it does not consider itself bound to undertake the further outlay which the investigation of the natural history of Kilimandjaro and Kenia must necessarily require. To effect this in a satisfactory way, a zoologist and botanist should be attached to Mr. Thomson's staff to make the necessary observations and collections. These gentlemen might perhaps be best left on the upper ranges of Kilimandjaro, while Mr. Thomson descends to the shores of the Victoria Nyanza, to rejoin him on his return towards the sea-coast. However this may be arranged, it is obvious that the addition of two Europeans to the expedition and the transport of their collection from the interior cannot be effected without materially increasing the cost. It is hoped, therefore, that the British Association for the Advancement of Science, which has already been in correspondence with the Geographical Society upon the subject of the proposed expedition, will take up this branch of the question, and at the approaching meeting at Southampton supply the funds necessary for the purpose. It would be a great misfortune if the excellent opportunity of solving a problem of first-rate importance which thus presents itself were to be thrown away for want of the few hundred pounds required to send out naturalists in company with the proposed expedition.

NOTES

WE can only express, for the present, the deep regret with which we learn the death of Prof. F. M. Balfour, a regret which we are sure will be shared by all who know anything of Mr. Balfour's career. The details to hand of the accident which led to Mr. Balfour's death are meagre. The news reached Cambridge on Sunday evening that he had been killed by a fall on the Alps. From later information it would seem that both Mr. Balfour and his guide met with their deaths on the glacier of Fresney, on the south side of Mont Blanc, about five miles west of the village of Courmayeur. The bodies have both been found. Mr. Balfour was only thirty-one years of age.

MR. GEORGE P. MARSH, the venerable American Minister at Rome, whose death, at the age of eighty-one years, has just been announced, was known as the author of the interesting work on "The Earth as Modified by Human Action," reviewed in NATURE, vol. xi. p. 82. His well-known work on "The Origin and History of the English Language" is also marked by a true scientific spirit.

THE German Association of Naturalists and physicians meets this year at Eisenach, from September 18 to 21. In deference to the wishes of many members, the duration of the meeting has been shortened this year by curtailing the festivities which have hitherto held so large a place in the proceedings of this venerable association. The Association, however, will really begin its work on the Sunday evening (September 17) by a "Zusammenkunft im 'Tivoli,'" and finish on the Friday (22nd) by an excursion to Kissingen, the programme including lunch, dinner, supper, and ball. On the 18th, Prof. Haeckel will give a lecture "On the Interpretation of Nature by Darwin, Goethe, and Lamarck"; and on the 21st Prof. Rehmke lectures on "Physiology and Kantism." As the German Association meets quite a fortnight later than our own, there is nothing to hinder English men of science attending both. It is a pity some arrangement could not be come to among the various associations to prevent simultaneous meetings. The English, French, and American Associations all meet this year at the same time; the Americans, at least, might have arranged differently, seeing that their meeting in Montreal next month is intended to be to some extent international.

MR. W. A. FORBES, the Prosector of the Zoological Society of London, has just left the country upon a four month's expedition up the River Niger. During his absence Mr. W. N. Parker has been appointed Deputy Prosector to the Zoological Society. To him all communications should be addressed during Mr. Forbes's absence.

THE United States Government have voted 10,000*l*. for the International Fisheries Exhibition. From the statement made by the Prince of Wales at a meeting of the General Committee last week, it is evident that the arrangements are progressing favourably.

MR. EUGENE OATES, who has been collecting in Pegu for the last fourteen years, is now in England, and has been studying for some months at the British Museum, his intention being to issue shortly a revised catalogue of the birds of Burmah, for which task his personal experiences in the field point him out as being admirably fitted.

MR. WM. DAVISON, who is so well known for his collections in Tenasserim and the Malay Peninsula, under the auspices of that energetic ornithologist, Mr. A. O. Hume, is also now in this country. We are glad to hear that Mr. Davison's health is fast becoming restored, and that he hopes soon to be able to return to the scene of his scientific explorations in Malaiasia.

VOL. I. of a large work on "Electric Illumination" will shortly be published at the office of *Engineering*. The volume refers to general principles, current generators, conductors, carbons, and lamps, the authors being Mr. Conrad W. Cooke, Mr. James Dredge, Prof. O'Reilly, Prof. Silvanus P. Thompson, and M. H. Vivarez; the whole will be edited by Mr. Dredge. A second volume will follow, to comprise installations, motive power, cost of production and maintenance, electrical photometry, secondary batteries, accessories to electric lighting, &c., &c., together with the completion of the patent abridgements from 1872 to 1882.

THE Algerian Government has sent to France a scientific mission to study the means of destroying the Phylloxera. It is mostly composed of viticulturists, apprehensive that the pest may eventually cross the Mediterranean.

"WHENCE comes the x of mathematicians?" is a question on which M. de Lagarde supplies some curious information (in a note to the Göttingen Royal Society of Sciences). The old Italian algebraists named the unknown quantity in an equation, *cosa*, or *res* (which they either wrote out or denoted by a sign). These are translations of the Arabic *šai*, thing, by which the Arabians in Spain indicated the unknown quantity—writing the Arabic equivalent of š; thus our $12x$ would be $\overset{\check{s}}{12}$. Now it has been the rule in Spain to express the Arabic š by the Latin x. Thus our mathematical x seems to have come from the Arabic for thing. Going further back, to the Greeks, it appears that Diophantus called the unknown quantity ἀριθμός; and for this, a final sigma, accented, came to be written. It is thought the Arabians may have denoted this by their š, and called it by the name for *thing*. The Greek name for the square of the unknown quantity was δύναμις, and for the cube κύβος; and the corresponding Arabian terms are clearly derived from these by translation; hence a probability of derivation in the other case (though not by translation).

WE lately noticed a full report on education in the United States, as delineated and reviewed by the Bureau. A later Circular (No. 6) calls special attention to the present teaching of physics and chemistry. The growth of science-teaching, it says, is evident everywhere; and how the movement will culminate, no one can say. To-day, chemistry and physics are taught in nearly all the academies and high schools in the land. Few cities report no teaching; and this circular is an attempt to catch the present aspect of affairs, and to assist and guide them. The supply of science students from the training colleges is increasing fast, and the number of teachers able to give laboratory instruction will soon be equal to the demand. The teaching at some of the older colleges, where the accustomed routine of a classical education cannot be dropped, is among the least satisfactory. The newer schools recognise science as a mental gymnastics and training equal to "Euclid's Elements and the Latin Grammar," always insisting upon the importance of experiment with didactic instruction. In a great majority of cases, nevertheless, mere text-book work is done, and as such work is little else than mischievous cram, our report advises that it be left out in primary and intermediate schools. Far better so, than a long series of lectures listened to term after term; for "three months of laboratory *work* will give more real insight into any science than a whole year's study of the printed page; the latter is like learning language from a grammar, only without attempting to translate or write exercises." It is specially urged, therefore, that the experimenting be done *by the pupils*, and the excellent results of such teaching, even to the youngest learners, are shown in very interesting cases quoted; and the same principle is followed in recommending that apparatus should be extemporised—this also by the pupils especially. "It will be invaluable to the future teacher; it vastly increases his power to interest and instruct his pupils, and at the same time it deepens his own insight into the subjects taught" The value of physical and chemical knowledge to medical men, the inadequate training of many of whom in America we recently noticed, to naval officers, and to women, is specially indicated and enlarged upon. But any such appeal to practical motives is hardly necessary in America, for the complaint is also made that applied science is most in demand, while pure science and research are too commonly ignored.

AT the last meeting of the Anthropological Institute, held at 4, Grosvenor Gardens, the residence of the President, General Pitt-Rivers, F.R.S., who occupied the chair, Lord Talbot de Malahide read a paper on the Longevity of the Romans in North Africa. The author gave several instances of epitaphs and inscriptions on tombs of persons whose age had exceeded 100 years, in some cases an age of 120, 130, and even 140 years had been attained. An interesting discussion ensued in which Mr. Villiers Stuart, M.P., Mr. Moncure Conway, Capt. Cameron, Mr. John Evans, Mr. Francis Galton, Sir Joseph Fayrer, Dr. Allen Thomson, Mr. Carmichael, and the President took part. Capt. R. F. Burton read a paper on some Neolithic Stone Implements and other objects brought by himself and Capt. Cameron from Wásá, on the Gold Coast. A large number of objects were exhibited by the authors and Mr. Ross. General Pitt-Rivers read a paper on the Egyptian Boomerang, and exhibited several specimens. A large collection of Bushman drawings was exhibited by Mr. M. Hutchinson.

A NEW volume of the Classified Catalogue of the Library of the Royal Institution of Great Britain, by Mr. Vincent, the Librarian, is now ready; it includes the most important works published during the last twenty-five years, placed under their respective heads, accompanied by a Synopsis and Indexes of Authors and Subjects.

THE half-yearly general meeting of the Scottish Meteorological Society will be held to-day. The business consists of (1) Report from the Council of the Society; (2) Address by D. Milne Home, of Milne Graden, Chairman; (3) The Rainfall of the British Islands, by Alexander Buchan, Secretary; (4) The Climate of Jerusalem, by Alexander Buchan, Secretary.

IN a paper recently read before the Asiatic Society of Japan, entitled "Religious and political ideas of the early Japanese; beginnings of the Japanese nation, and credibility of the national records," Mr. B. H. Chamberlain (according to the *Japan Mail*), after mentioning the difficulties which beset investigation, and giving an analysis of the religious and so-called historical traditions of early Japan, proceeded to draw, both from the matter itself and from the manner in which it was put together in the histories as we now have them, several conclusions as to the condition of the early Japanese, and the influences which moulded them into the united nation which meets us at the dawn of authentic history. The most important of these conclusions were:—1. That there were three centres of legendary cycles in ancient Japanese, Idzumo, Yamato, and Kinshsiu, and that the country was probably divided into three or even a greater number of states. 2. That instead of having only begun to communicate with the mainland of Asia at about the year 200 A.D., as was commonly supposed, there had never been, so far as we can judge, a time when communication did not exist, and that much of the so-called autochtonous civilisation was really imported, as was proved by a sifting of myths, and even by the test of language, the most archaic form of Japanese, containing a number of Chinese words for implements or ideas that had themselves been borrowed. 3. That authentic history did not in Japan go back farther than A.D. 400, *i.e.* more than a thousand years later than the date commonly accepted for its commencement. Mr. Chamberlain noticed in detail the items scattered through *Kozhiki*, or oldest monument of Japanese literature, relative to the governmental arrangements and religious belief of ancient times, and showed that Shinto was not a religious system properly so-called, but rather a bundle of miscellaneous and often inconsistent superstitions.

DURING a heavy thunderstorm in the Shetland Islands on Tuesday, which lasted several hours, a hill, three miles from Lerwick, was struck by lightning, and huge masses of rock and *débris* were thrown down on the public road which the hill overhangs, filling up the road and the valley at the other side, and suspending traffic. The total weight of the fallen rock is estimated at 400 tons.

LAST week the statue of Mariette Bey, the great French Egyptologist, was unveiled at Boulogne, in presence of a large assembly, including several high officials of the French Republic.

THE report on the proposed grant to the French Minister of Posts and Telegraphs of a sum of 3600*l.*, in view of the meeting of Electricians, has been sent to the French Senate, after having been adopted by the Chamber of Deputies. This meeting will take place only in October. One of the reasons alleged for the delay is the necessity of installing the magnetic instruments now in course of construction for the Observatory of Paris. The assent of the French Senate is stated to be beyond a doubt.

FROM the "Mineral Statistics of Victoria" for 1881 we see that the quantity of gold raised last year was 858,850 oz., being 29,729 oz. more than the quantity obtained in 1880. The deepest shaft in the Colony is the Magdala at Stawell, which is 2409 feet deep.

SOME instructive results have been recently obtained by M. Spring, in studying the dilatation of isomorphous substances (*Bull. Belg. Acad.*, No. 4). He experimented with five alums. These, he shows, expand very regularly, and very little with rise of temperature from zero till a critical temperature is reached (different for each), at which there is rapid expansion, indicating decomposition. Up to 60°, the mean critical temperature, these alums may be said to expand equally, and M. Spring is led to affirm that *isomorphous substances have the same coefficient of expansion*, or at least coefficients very little different. A probable inference is that they have the same coefficient of compressibility; this he has yet to test. Thus, a similarity in physical properties, between isomorphous substances and gases, is suggested; and a law similar to Avogadro's may be applicable, viz., equal volumes of those (isomorphous) substances must contain the same number of molecules. In verification of this is the fact shown by M. Spring, that the quotients of the specific weights of the alums by the respective molecular weights are equal. Thus the law of Avogadro, verified hitherto in its consequences only for gases, may be found to strike its roots even into solid bodies, and the problem of determining the molecular magnitudes of the latter may one day receive a solution conformably to modern theories of chemistry. M. Spring is extending his examination to other isomorphous substances, and will also study the ratio of expansion and contraction in heteromorphous bodies.

THE third instalment of Dr. Hermann Müller's "Further Observations on the Fertilisation of Flowers by Insects" is occupied by observations, supplementary to those recorded in his "Befruchtung der Blumen durch Insekten," on the insects which visit particular species and assist in their pollination, with some notes on corresponding peculiarities of structure in the flowers themselves. It is illustrated by a very beautifully executed plate.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Lady Parkyns; an Egyptian Fox (*Canis niloticus*) from Egypt, presented by Mr. Horace Kemp; two Coypu Rats (*Myopotamus coypus*) from South America, two Common Night Herons (*Nycticorax griseus*), European, presented by Mr. A. A. van Bemmelen; two Californian Quails (*Callipepla californica*) from California, presented by Mr. J. Biehl; a Crocodile (*Crocodilus*, sp. inc.) from Black River, presented by Mrs. A. H. Jamrach; an Æsculapian Snake (*Coluber æsculapii*) from Central Europe, presented by Lord Arthur Russell, M.P.; two Australian Fruit Bats (*Pteropus poliocephalus*), a Black-breasted Peewit (*Sarciophorus pectoralis*), an Australian Monitor (*Monitor gouldi*) from Australia, two Porto Rico Pigeons (*Columba corensis*) from the West Indies, a South American Jabiru (*Mycteria americana*), two Brown Thrushes (*Turdus leucomelas*) from South America, two Demoiselle Cranes (*Anthropoides virgo*) from North Africa, three Blue-shouldered Tanagers (*Tanagra cyanoptera*), a Striated Tanager (*Tanagra striata*), a Tanager (*Saltator*, sp. inc.) from Brazil, two Scops Owls (*Scops asio*) from North America, two Yellow Sparrows (*Passer luteus*) from East Africa, two Beautiful Waxbills (*Estrelda formosa*) from India, purchased; a Two-spotted Paradoxure (*Nandinia binotata*), a Hybrid Sclater's Muntjac (between *Cervulus muntjac* ♀ and *Cervulus lacrymans* ♂), born in the Gardens. The following insects have emerged in the Insect House during the past two weeks:—Silk Moths: *Actias selene, Telea polyphemus, Telea promethea;* Moths: *Ceratocampa imperialis, Bombyx castrensis, Zygæna filipendulæ, Liparis monacha, Deilephila vespertilio, Deilephila euphorbiæ, Bembecia hylæiformis, Plusia concha;* Butterflies: *Parnassius apollo, Melanagria galathea, Goneopteryx rhamni, Vanessa io, Vanessa polychlorus, Araschnia levana* var. *prorsa, Theela betulæ, Theela spina, Epinephele janira, Erebia blandina.*

OUR ASTRONOMICAL COLUMN

THE WEDGE PHOTOMETER.—In a communication to the American Academy of Arts and Sciences in May last (NATURE, vol. xxvi. p. 259), Prof. Pickering has some remarks upon the use of a wedge of shaded glass as a means of measuring the light of the stars. He considers that, while it has been maintained by some writers that it is not a new device, "the credit for its introduction as a practical method of stellar photometry seems clearly to belong to Prof. Pritchard, director of the University Observatory, Oxford." Various theoretical objections to this photometer have been advanced, and many sources of error suggested, but Prof. Pritchard has made the best possible reply to them by measuring a number of stars, and showing that his results are in very close agreement with others obtained elsewhere by wholly different methods. His photometer "consists of a wedge of shade glass of a neutral tint inserted in the field of the telescope, and movable, so that a star may be viewed through the thicker or thinner portions at will. The exact position is indicated by means of scale." The measure of the brightness of the star is made by bringing it to the centre of the field and moving the wedge from the thin towards the thick end until the star disappears. Stars must always be kept in the centre of field to insure the readings being comparable. But Prof. Pickering makes the ingenious suggestion that this photometer may be further simplified by substituting the earth's diurnal motion as a measure of the position of the star in the wedge at disappearance. "It is only necessary to insert in the field a bar parallel to the edge of the wedge, and place it at right angles to the diurnal motion, so that a star in its transit across the field will pass behind the bar and undergo a continually increasing absorption as it passes towards the thicker portion of the wedge. It will thus grow fainter and fainter, until it finally disappears." Then the interval of time from the passage behind the bar until the star ceases to be visible becomes a measure of its light, and the time will vary with the magnitude. As in Prof. Pritchard's form of the instrument, it is only necessary to determine the value of a single constant. Prof. Pickering adds some suggestions with regard to observations with this photometer, and recommends them to the attention of amateurs.

THE OBSERVATORY IN YALE COLLEGE, U.S.—Prof. H. A. Newton, who was appointed Director of the Winchester Observatory in Yale College, New Haven, U.S., in May last, has drawn up a report on the present state of this establishment, and of the preparations in progress for placing the instruments in new buildings specially erected to receive them. The heliometer ordered from Repsold, of Hamburg, two years since, was received last spring; the cost, including freight, and other expenses to New Haven, being close upon 7460 dollars. To supplement the heliometer, and also for independent work, an equatorial telescope of 8 inches diameter was ordered from Mr. Howard Grubb of Dublin, and is expected in August. (No mention is made by Prof. Newton of the 9-inch Alvan Clark refractor, which Yale College was stated to possess in the Smithsonian report on astronomical observations in 1880). About nine acres from the southern extremity of the observatory lands have been set apart as a site for the observatory, and the erection of two towers for the heliometer and equatorial respectively, has been commenced. The heliometer tower was expected to be ready for the instrument early in July, the dome constructed by Mr. Grubb having been already put in place. It is intended by Prof. Newton to undertake such work with it, immediately it is available, as shall prepare for the most advantageous use of the instrument during the approaching transit of Venus. In the Smithsonian report referred to, the diameter of the object-glass is stated to be 6 inches.

The income derived from the fund set apart by the late Hon. O. F. Winchester, is to be applied for the maintenance of the observatory. The 8-inch equatorial has been purchased from funds generously provided by a private individual, who for the present does not desire his name to be mentioned. Under the direction of Prof. H. A. Newton, supported by such liberality, astronomers will look forward to a bright future for the "Observatory in Yale College"—as, with the assent of Mr. Winchester's family, the institution is to be called.

THE TRANSIT OF VENUS.—In consequence of the sudden death of Mr. Burton, who, as we mentioned last week, had been appointed observer at Aberdeen Road, Cape Colony, we understand Mr. A. Marth will have charge of that station.

It is not improbable that some readers may contemplate proceeding for the purpose of observing this phenomenon (which will not recur till the year 2004), where it is visible from ingress to egress, and perhaps with a view at the same time of escaping a winter in this climate. If such there be, they might not readily fix upon a more advantageous station than the Blue Mountain range in the island of Jamaica or its vicinity. Calculating for a point in longitude 77° 30′ W., latitude 18° 5′ N., the times of contacts and sun's altitudes are as follows:—